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Estimation of the horizontal stresses from breakouts data collected at Site C0002 of the Nankai accretionary wedge during IODP Leg 314

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NanTroSEIZE (Nankai Trough Seismogenic Zone Experiment) is a multi-expedition IODP project that attempts to drill into, sample, and place instruments at different sites and different depths into and aside the seismogenic portion of a plate boundary fault (megathrust) within the Nankai Trough subduction zone. The primary goal of the first expedition (IODP Leg 314 from September to December 2007) of NanTroSEIZE, is downhole measurements at five sites along a transect from the subducting plate to the Kumano forearc basin using Logging While Drilling (LWD) technology. One important result of LWD resistivity imaging is the presence of borehole breakouts indicating a permutation of the stress axes between the wedge and forearc basin domain. These breakouts are non-catastrophic compressive failures of the wellbore wall that occur during drilling when the failure conditions are reached. The orientation and magnitude of the horizontal stresses (SHmax and Shmin) can be determined from the orientation and width of the borehole breakouts, the fluid pressure in the borehole and in the formation and the mechanical properties such as friction coefficient, unconfined compressive strength, and Poisson's ratio of the surrounding rocks. This work focused on the estimation of the horizontal stresses and of their variations with depth at Site C0002 drilled through 870 m of the Kumano forearc basin followed by 80 m of slope basin sediments and 450 m of older accretionary wedge formation. The modified

Wiebols and Cook rock failure criterion was preferred to the Mohr-Coulomb criterion for the calculations of stress magnitudes because the former criterion is known to be more accurate in the case of an anisotropic state of stress. Friction coefficient and Poisson's ratio were estimated from previous laboratory work on samples from Nankai accretionary wedge. The unconfined compressive strength (UCS) was estimated from LWD P-waves velocity measurements. Preliminary results indicate a rotation of stress of $\sim 25^{\circ}$ between the slope basin sediments and the older accretionary wedge formation. The domain of breakout formation corresponds to an extensionnal stress state in the upper domain and changes to a stress state corresponding to strike slip or compression in the deeper section. Other variations of stress at smaller scales are being studied all along the well.